

while young, and had grown up without parental care, which has caused a slight modification." It also shows that the Serag Whale of the east coast of North America is not the same as the Finner of the coast of Spain, as it ought to be, according to Prof. Van Beneden's theory of the distribution of these animals.

Mr. Cope describes, as a second species of the genus, *Agaphelus glaucus*, or the Grey Whale of the coast of California. Mr. Cope thinks that *Balena agamachusik* of Pallas is allied to it, and he observes that "Dr. Gray has already (Cat. Brit. Mus.) indicated that this, if reliable, indicates a genus unknown to him." Two skeletons, and the baleen of a third, of the Grey Whale are known as existing in America.—J. E. GRAY.

*Investigation of the Organization and Development of the Dipterous genus Volucella.* By JULES KÜNCKEL.

One portion of my investigation enables me to demonstrate certain unexpected facts with regard to the development of the appendages and tegumentary pieces. When we open a larva of *Volucella* we detect some small bodies grouped round the pharynx and nervous centres, and arranged symmetrically in pairs. I have ascertained that these bodies are the first rudiments of the head, thorax, and appendages of the adult *Volucella*. The two foremost masses are the embryonal parts of the pieces of the head which will form the frontal region; the second, which rest upon the brain, are the rudiments of the eyes; the third, placed upon the sides, will constitute the superior segment of the prothorax; the two following will unite to form the superior segment of the mesothorax and the wings; the fifth pair of these embryonal masses will form the dorsal segment of the metathorax and the halteres; and the three other pairs will give origin to the three inferior segments of the thorax with their appendages, the feet.

Each of these bodies consists of an aggregation of large cells held together by an envelope; the cells commence their activity during the transformation into a pupa. At the moment of the metamorphosis, there is an increase in the size of these rudiments; and the work of organization of the cells takes place with such rapidity that, as early as the second day, we may recognize the different joints of the limbs in the embryonal parts.

All these parts have an identical and very remarkable mode of development. The cells which they contain group themselves at first in such a manner that we may distinguish a peripheral zone and a central mass. The peripheral portion will constitute the tegumentary pieces; the central portion the appendicular pieces of the thorax. It is by the same principle of division that these appendicular pieces are formed. I have thus followed throughout, and with the greatest care, the course of development of the integuments and of the appendicular system; in this case the observations bring to light an important fact in the embryogeny of insects, namely, that the integuments and appendages of the adult, at least in the Diptera, are not

constituted by a development or transformation of the corresponding parts of the larva, but by a new formation.

We have detected a curious adaptation to their mode of life in the larvæ of the *Volucelle*. One species lives in the nests of hornets, another in those of the common wasps, and another in the nests of humble-bees; a special armature secures to each of them an easy progress upon the particular substance of which each of these nests is constructed. When adult, the *Volucelle* seem to have borrowed the clothing of the hornets, wasps, or humble-bees, in order to come and lay their eggs in the habitations of those insects.

In the nervous system of the *Volucelle* we have observed remarkable transformations. The very general character of the nervous system of insects in course of development is, to affect in the larvæ the form of a long ganglionic chain, undergoing a more or less considerable abbreviation as the animal advances in age. This abbreviation takes place in the connectives, and induces the fusion of several ganglia. On the contrary, in our Diptera, in the larva state, the nervous centres are approximated and so intimately united that they only form a single mass; with advancing age a separation is effected between the nervous centres of the head, thorax, and abdomen, at the same time that long connectives are formed uniting the medullary masses to each other. The important fact to be noted is, that this observation must modify the too general idea which has been conceived with regard to the changes which the ganglionic chain undergoes in the period of transition from the state of larva to the adult state.

On another hand the change of diet of our *Volucelle* on passing from one form to the other offered us a subject of investigation of high interest. The larvæ of the *Volucelle* are carnivorous; the adults live upon pollen: the diet corresponds to the differences presented by the digestive apparatus in the two states. The larva has no receptacle for food; the adult, on the contrary, is furnished with an ample crop: the former, having an abundance of nourishment always within its reach, has no abstinence to fear; for the adult, which is often prevented from seeking its nourishment by atmospheric conditions, an alimentary receptacle becomes very useful.

The salivary glands of the larvæ are enormous: the diet of the insect having to change, a transformation of its glands is effected during the pupal period; they are in part destroyed, to be afterwards regenerated with a different histological constitution. In the adult they have acquired the form of slender tubes, which extend into the thorax and abdomen. Equally great modifications take place in the same way in the four appendages of the stomach—long cæcal tubes, which are replaced by four conglomerated glands.

With regard to the respiratory apparatus, we must also cite some of the results of our observations. It affects a special character in each phase of the life of the insect. In the larva we find four stigmata—two anterior, on the second segment, and two posterior, on the twelfth segment. When the animal is metamorphosed, the integument separates from the skin of the larva, the orifices for the

admission of air disappear, and two tubes, which might be taken for horns, issue from the anterior dorsal part of the pupa. It is at the surface of these horns that the peculiar stigmata of the pupa are seated; and I have ascertained that these orifices, to which no attention has been paid, are in considerable numbers. In the adult there is no longer any trace of these respiratory orifices at the place which they occupied in the pupa; but seven pairs of stigmata have been produced on the sides of the thorax and abdomen. This multiplicity of the stigmata coincides with the increase of the respiratory activity, denoted by the perfection of the tracheal apparatus.

Of all the organic systems the circulatory system undergoes the least important transformations. In the larvæ of the *Volucelle* the heart, extended in a straight line from one extremity of the body to the other, has the aortic portion very short; in the adult the heart becomes incurved to take the form of the body, and a long aorta traverses the thorax.

One of the most essential facts which springs from this investigation of the organization of the *Volucelle* is, that, at least in the Diptera, the development of certain apparatus of the adult is accomplished by a transformation of the organs of the larvæ, whilst the development of other apparatus is effected by entirely new formations.—*Comptes Rendus*, December 21, 1868, tome lxxvii. pp. 1231–1234.

### Sphenodon, Hatteria, and Rhynchocephalus.

By Dr. J. E. GRAY.

In the first part of my 'Zoological Miscellany,' published in 1831, I shortly described the skull of an Agamoid Lizard, of very peculiar structure, that I had seen in the Museum of the College of Surgeons, and I proposed to regard it as a new genus, named *Sphenodon*.

In the second part of the same work, published in 1841, I described a Lizard, which I had received in spirits from New Zealand, under the name of *Hatteria punctata*.

Professor Owen, in the first volume of the 'Descriptive Catalogue of the Osteological Series contained in the Museum of the Royal College of Surgeons,' published in 1853, at p. 142. nos. 662, 663, described with considerable detail the skull and the five vertebræ of the trunk of a Lacertian which he names *Rhynchocephalus*. The skull so named is evidently the same as that I described in the 'Zoological Miscellany,' in 1831, as *Sphenodon*, though the specimen is said in the Catalogue to have been presented by Prof. Owen, whose name certainly was not attached to the specimen when I described it. The specimen is still in the collection, but without the lower jaw, which was with it in 1831.

When I described the *Hatteria punctata* from the specimen in spirits I had no idea that it was the same Lizard that I had described from a skull under the name of *Sphenodon*; for it is not easy to observe the characters on which the genus *Sphenodon* was described without dissecting the animal.

A second specimen of *Hatteria* arriving at the British Museum,